ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Issue 7, July 2015

A Obliging Proxy-Client Hoarding System for On Demand Video Gushing

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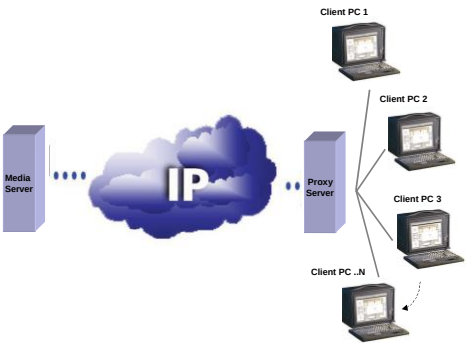
ABSTRACT: This paper is used to avoid the clients from directly accessing the server for video streaming. By this we can avoid the server from over loading and save the access time for each client. An Intermediate server concept is used here and acts as bridge between the client and main server. The idea is a client not only receives service but also offers service to other clients as a peer.

I. INTRODUCTION

In streaming video applications are commonly used by most clients to watch video. The so far, implemented streaming functionality, however, presents many technical challenges at the client, server and the network that have not yet been efficiently resolved.

To provide efficient streaming to the client is the goal. The client in a distributed environment is connected to the server through a network The edge router called here as Proxy server of the network relieves the server of its process and responds to the request for streaming as requested by the client.
In this paper, we propose a proxy-assisted video streaming architecture that takes advantage of the resources (processing and disk storage) available at proxy servers to significantly reduce the server and network resource requirements, while at the same time providing near-instantaneous service to clients. The central server multicasts video objects periodically. Proxy servers are strategically placed between, say, local access networks and the backbone wide-area network.

A proxy server stores a fixed number of initial frames or a "prefix" of the multimedia stream so as to serve the future requests: when a new request arrives, the client joins an on-going multicast group to retrieve the multicast stream from the central server and retrieves the missing initial frames from the proxy server. The missing portion of the prefix is delivered by the proxy using a unicast channel and played back immediately by the client. Hence, the proxy server reduces the service latency experienced.



Existing System

Existing Internet streaming media delivering techniques are either based on a client-server model, such as, proxy caching and server replications by CDNs, or based on a client-based Peer to Peer structure. Special content delivery

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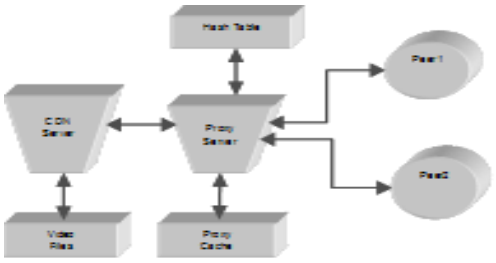
networks (CDNs) have been built to replicate media servers across the Internet to move the contents close to the clients.CDN architecture is based on the number of CDN servers placed at the edges of the Internet. The video content is first distributed to these servers and then delivered by each CDN server to clients in its neighborhood. This approach is performance-effective but not cost-effective.

The second approach is to utilize existing proxies to cache media data, which is cost-effective but not scalable due to limited storages and bandwidths of centralized servers. For a large media object, such as a two-hour video, treating the whole media as a single object for caching is not appropriate

The third approach is to build client-based Peer to peer overlay networks for media content delivery, which is highly cost effective but does not guarantee the quality of service because the capacities (CPU, storage, and bandwidth) of peers can be heterogeneous and their availabilities can be transient.



II. PEER-TO-PEER MODEL

Problems in Existing System

- The server alone has to fulfill the entire client request.
- The client has to wait for a long time for each and every access.
- When the server gets heavy load it automatically gets restarted as a result the transaction it progress will be deleted, so the client has to once again start from the beginning.

Proposed System

- Peer to Peer assisted proxy system significantly improves the quality of streaming service mainly because the caching storage in Peer to Peer assisted proxy has been effectively and highly enhanced.
- In a our proposed scheme a client not only receives service but also offers service to other clients as a peer. Clients collaborate with one another to reduce the video server load Thus, media segments can be timely and smoothly delivered to any end user in the system either by other end users or/and by the proxy collaboratively.
- The collaboration and coordination between the proxy and its Peer to Peer clients in our system address the scalability problem of the proxy-based technique, and also eliminate the concern of unstable quality of services by only relying on self-organized clients. These two system components are complimentary to each other: The proxy provides a dedicated storage and reliable streaming services when peers are not available or not capable of doing so, while peers provide a scalable storage for data caching and significantly reduce the service load of the proxy.
- To improve the reliability and maximize the utilization of cached data in each peer, a model is proposed to analyze the cache redundancy in our peer to peer caching system where peers are free to come and go. Our modeling results give the optimal replica distribution in such a system, and provide the guidance to cache replacement policy design.
- To improve the cache utilization, we have proposed a model and designed the replacement policies for the collaboration and coordination between the proxy and clients accordingly, making the entire streaming media system both performance-effective and cost-efficient.

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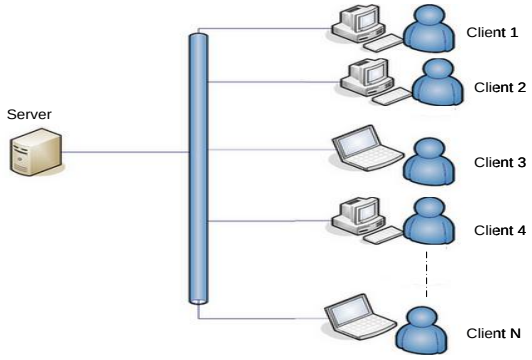
III. LITERATURE REVIEW

Client / Server Model

The term client/server was first used in the 1980s in reference to personal computers (PCs) on a network. The actual client/server model started gaining acceptance in the late 1980s. The client/server software architecture is a versatile, message-based and modular infrastructure that is intended to improve usability,flexibility, interoperability, and scalability as compared to centralized, mainframe, time sharing computing.

A client is defined as a requester of services and a server is defined as the provider of services. A single machine can be both a client and a server depending on the software configuration.



IV. CLIENT-SERVER MODEL

A Client / Server model describes the relationship between two computer programs in which one program, the client, makes a service request from another program, the server, which fulfills the request.

Proxy Server

A proxy server is a computer that offers a computer network service toallow clients to make indirect network connections to other network services. The word proxy means "to act on behalf of another," and a proxy server acts on behalf of the client and the server. All requests from the clients to the server go to the proxy server first. The proxy evaluates them, and if allowed, re-establishes the requests to the server.

Peer to Peer Network

A peer-to-peer system is a distributed system whose component nodes participate in similar roles, and are therefore peers to each other. Peer-to-peer can be viewed as decentralized network architecture. In contrast, a Client-server architecture implies a sharp distinction between the clients which request and consume services, and servers which provide services.

Sockets

A socketis one endpoint of a two-way communication link between two programs running on the network. A socket is bound to a port number so that the TCP layer can identify the application that data is destined to be sent. Socket classes are used to represent the connection between a client program and a server program. The java.net package provides two classes—

Socket and ServerSocket--that implement the client side of the connection and the server side of the connection, respectively. A network socket is a lot like an electrical socket. Various plugs around the network have a standard way of delivering their payload. Anything that understands the standard protocol can plug in to the socket and communicate.

To implement networking in the software, the java.net.Socket class and the java.net.ServerSocket class are used. Thejava.net.Socket class implements client sockets. A socket is an endpoint for communication between two machines.Thejava.net.ServerSocket class implements server sockets. A server socket waits for requests to come in over the network. Thus both the classes working together form a TCP connection between two machines.

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V. MEDIA SERVER

Special media server has been built to distribute multimedia objects across the Internet. It is the origin of media streaming and maintains media files that are divided into clips. Media server stores media objects in a file system. It is always listening for incoming request from the proxy server and capable of transferring large video files.

Media server is developed using socket, which supports TCP/IP protocol. Server has been designed using graphical user interface to start and view the media files available with the server. Server is capable of storing large volume of media files depends on the capacity of file system available with the server. Server supports MPEG video format, which are stored as a video segments. Server needs high-end machine for deployment.

Hash Table

Hash tableis the efficient way of storing and retrieving (key, value) pair. It maps (key, value) pair where each key is the identifier of a media segment and the corresponding value is the location of the segment. The insert(seg id, location) operation publishes a cached copy of media segment in the client system, in which seg id is the segment identifier, and location is the IP address and port number of the client that caches the segment copy. Correspondingly, the delete (seg id, location) operation unpublishes the copy of media segment stored in the client location.

Popularity and Replacement Algorithm

The proxy should hold popular media objects to minimize the performance degradation due to client failures. The segment with the smallest popularity is chosen as the victim to be replaced when the proxy cache is full. Considering both the recent access and past access information, the proxy can cache the most useful media data for clients. Due to the client access patterns, the popular objects get more accesses from clients, and thus, have more copies cached in the system, which are already cached on the proxy side and permanent cache of the client.

The replacement policy is designed to replace both those media segments with diminishing popularities because they rarely get accessed, and those popular media segments with too many copies being cached. The proxy takes over the streaming service whenever the requested media segment cannot be served by any peer in the system. Thus, the proxy should hold those popular media objects to minimize the performance degradation due to peer failures.

We use a popularity-based replacement policy instead of Least Recently Used (LRU) policy that is commonly used in Web proxies because LRU is not efficient for file scan operations, which are typical in media streaming services and can only exploit the locality of reference to the proxy instead of the whole system.

We define the *popularity* of a segment as

$$p = \frac{\frac{S_{sum}}{S_0}}{T_r - T_0} \times \min\left(1, \frac{\frac{T_r - T_0}{n}}{t - T_r}\right)$$

where t is the current time instant, $\frac{\frac{S_{sum}}{S_0}}{T_r - T_0}$ represents the average access rate of the segment in the past, normalized by the segment size, and $\min\left(1, \frac{\frac{T_r - T_0}{n}}{t - T_r}\right)$ represents the probability of future access: $\frac{T_r - T_0}{n}$ is the average time interval of accesses in the past; if $t - T_r > \frac{T_r - T_0}{n}$ the possibility that a new request arrives is small. Otherwise, it is highly possible a request is coming soon. The segment with the smallest popularity is chosen as the victim to be replaced when the proxy cache is full. Considering both the recent access and past access information, the proxy can cache the most useful media data for clients.

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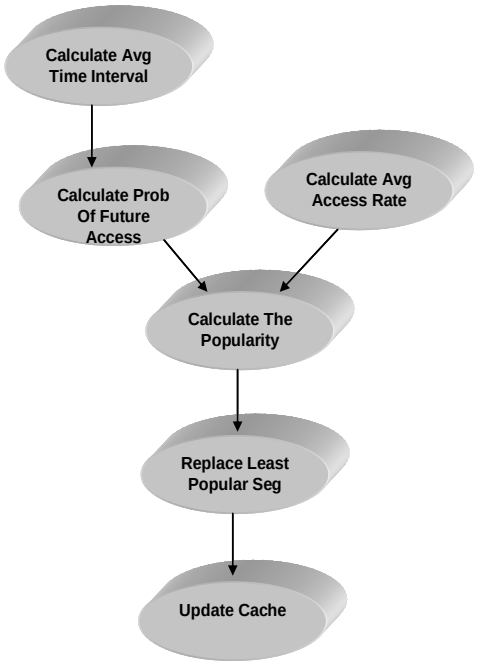
VI. Conclusion



Existing Internet streaming media delivering techniques are either based on a client-server model, such as, proxy caching and server replications by CDNs, or based on a client-based Peer to Peer structure. The disadvantage of the client-server model is its limited scalability and high cost, while the disadvantage of a client-based Peer to Peer system is its unreliable quality of streaming media delivery due to the dynamic nature of peers.

In this study, we propose Peer to Peer assisted proxy systems to address these two limitations. In our system, the proxy is a member of the Peer to Peer network managed by the distributed hash table. In addition, the proxy also plays an important and unique role to ensure the quality of media delivery due to its dedicated and stable nature.
To improve the cache utilization, we have proposed a model and designed the replacement policies for the collaboration and coordination between the proxy and clients accordingly, making the entire streaming media system both performance-effective and cost-efficient. We have conducted extensive experiments to evaluate various aspects of our design, and the results shows that our systemcan achieve 2.4 times improvement in byte hit ratio compared to client-based Peer to Peer systems and proxy-based Peer to Peersystems.

VII. FUTURE ENHANCEMENTS

- This paper offers ample scope for enhancement in the near future. The efficiency of the system can be greatly improved.
- In our proposed system, we have implemented the efficient distribution only for the video files. In future, the same can be implemented to any types of files.
- We have implemented our project in LAN at present. In future, it can be implemented in any kind of network.
- This project can be used in the computer centers where multiple clients are doing video downloading from a local server.
- In future, this project can be used by the Basic Internet Service Providers (ISP) for having single centralized server for all clients.

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